R. C. SEYMOUR.

FOLDING MACHINE.

APPLICATION FILED JULY 5, 1917.

1,312,458.

Patented Aug. 5, 1919.

4 SHEETS—SHEET 1.

Fig. 1.

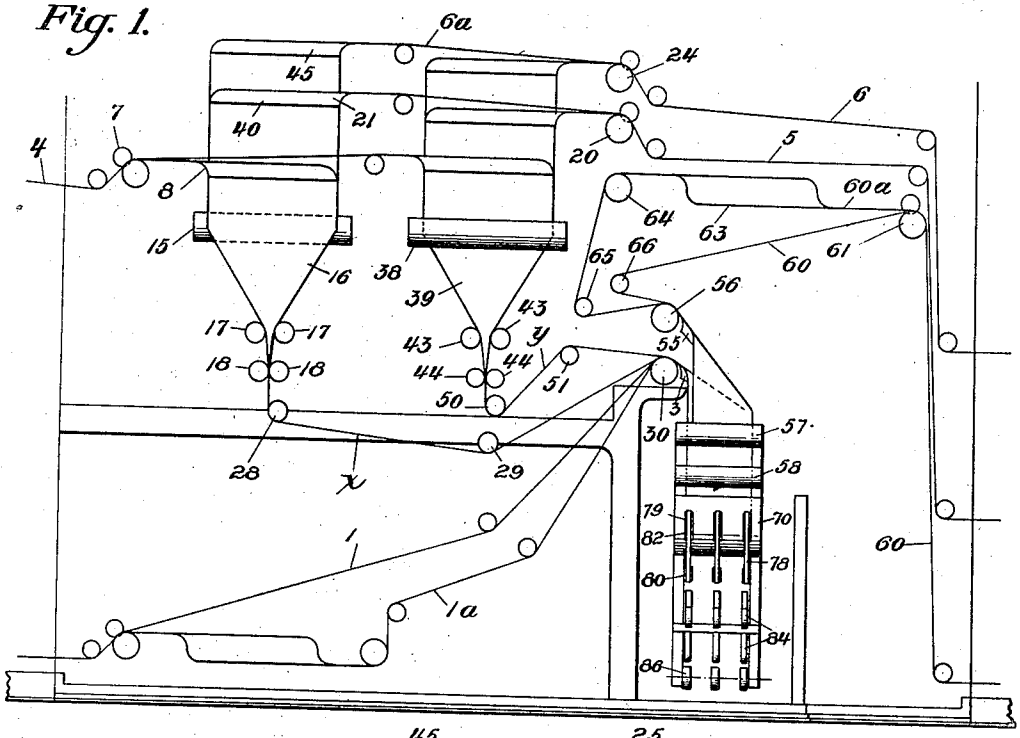
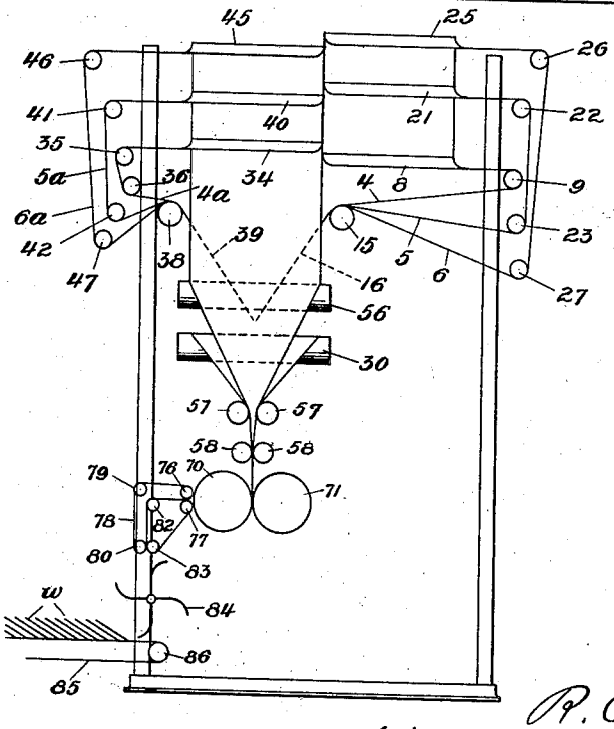


Fig. 2.



Witnesses,

Inventor

R. C. Seymour

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John D. Morgan

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4 SHEETS—SHEET 2.

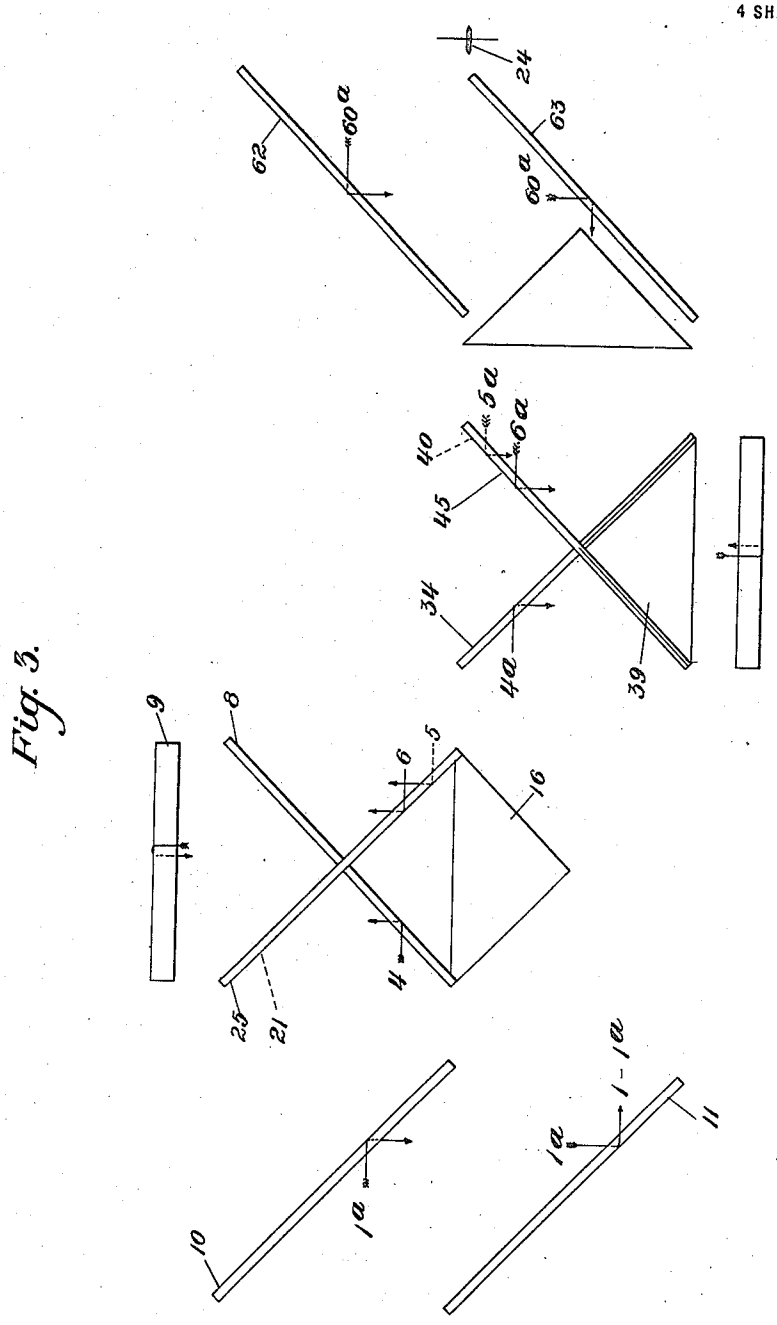


Fig. 3.

Witnesses,

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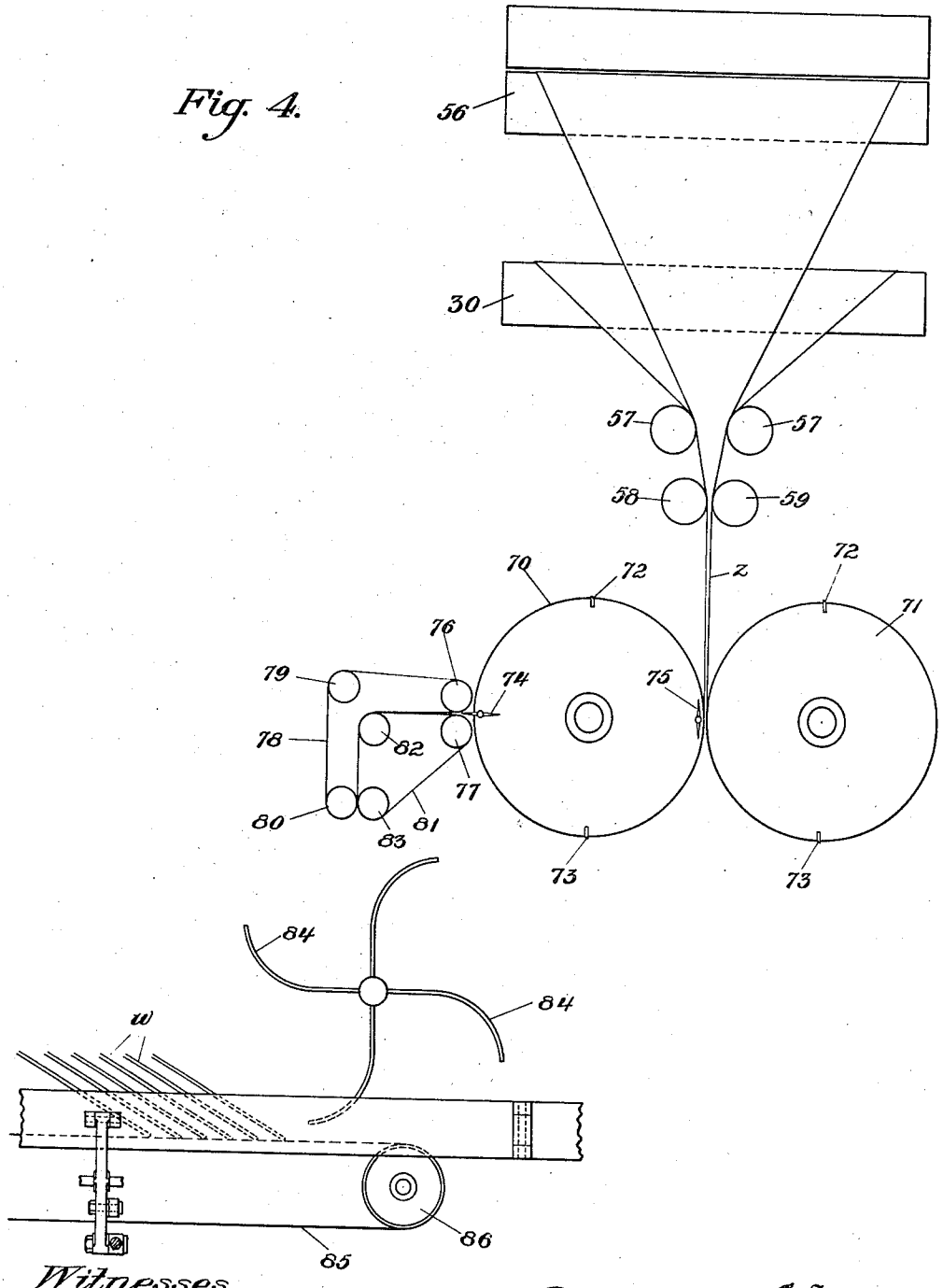
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4 SHEETS—SHEET 3.

Fig. 4.



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4 SHEETS—SHEET 4.

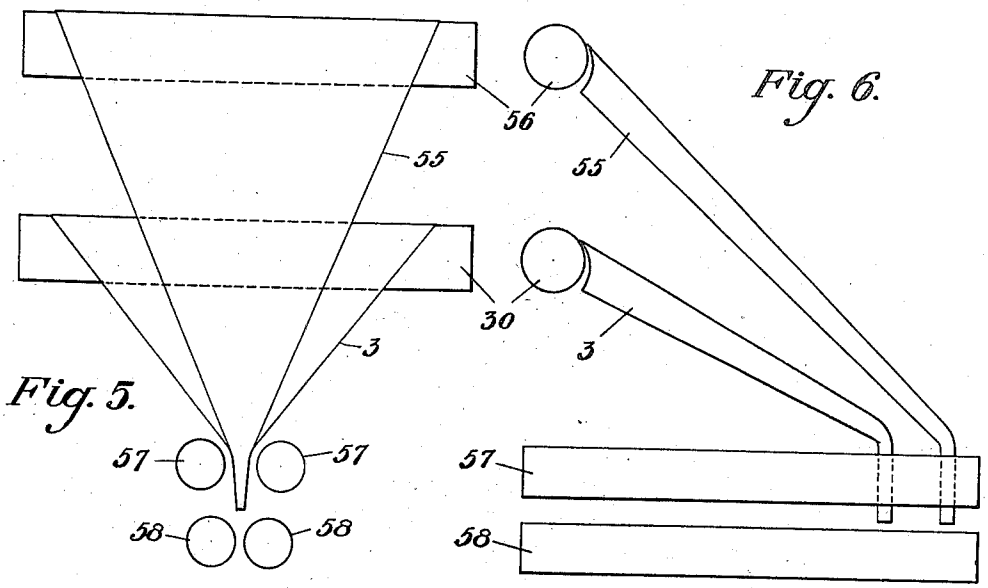


Fig. 6.

Fig. 5.

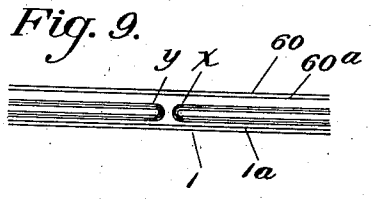


Fig. 9.

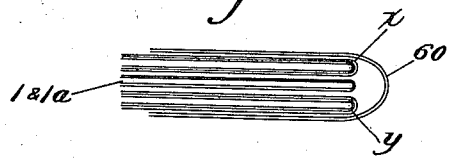


Fig. 10.

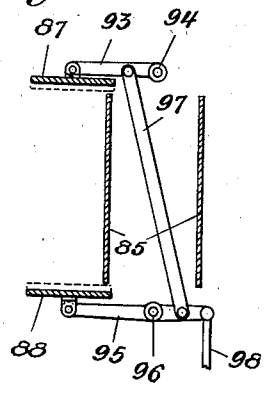


Fig. 8.

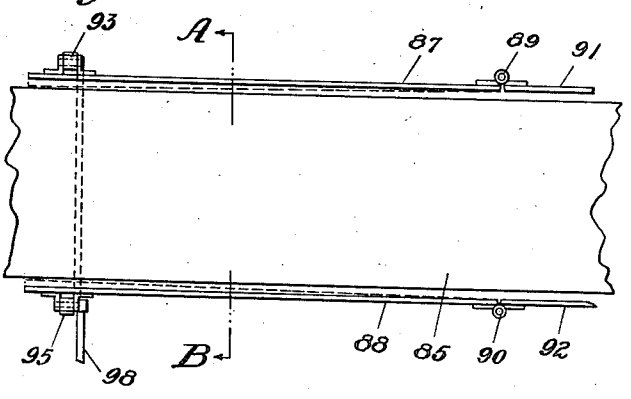


Fig. 7.

Witnesses,

Inventor
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By his Attorney
John D. Morgan

UNITED STATES PATENT OFFICE.

RALPH C. SEYMOUR, OF LARCHMONT, NEW YORK, ASSIGNOR TO GOSS PRINTING PRESS COMPANY, A CORPORATION OF ILLINOIS.

FOLDING-MACHINE.

1,312,458. Specification of Letters Patent. Patented Aug. 5, 1919.

Application filed July 5, 1917. Serial No. 178,690.

To all whom it may concern:

Be it known that I, RALPH C. SEYMOUR, a citizen of the United States, residing at Larchmont, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Folding-Machines, of which the following is a specification.

The invention relates to printing and folding mechanisms, and more especially to such mechanisms adapted for use in fast rotary presses, and which produce a product of various folds and printings, which are finally stuffed or inset, and folded together as a single product.

Objects and advantages of the invention will be more fully set forth in part hereinafter, and in part will be obvious herefrom, or may be learned through practice with the invention.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described; and in certain of its aspects is an improvement in or modification of the invention set forth in application Ser. No. 175,416 of Hubert Lang, filed June 18, 1917.

The accompanying drawings, herein referred to, and constituting a part hereof, illustrate one embodiment of the invention, and together with the description serve to explain the principles thereof.

Of the drawings:

Figure 1 is a fragmentary elevation, partly diagrammatic, of a machine constructed in accordance with the principles of the invention;

Fig. 2 is an end elevation, looking at Fig. 1 from the right, with certain of the web guiding rolls omitted;

Fig. 3 is a diagrammatic top plan, on an enlarged scale, of the mechanism shown in Figs. 1 and 2;

Fig. 4 is a view, on an enlarged scale, corresponding to the lower half of Fig. 2;

Fig. 5 is a fragmentary view corresponding to the upper part of Fig. 4;

Fig. 6 is a view corresponding to Fig. 5 looking thereat from the left;

Fig. 7 is a fragmentary plan of the delivery and jogger mechanism;

Fig. 8 is a transverse vertical section, on the line A—B of Fig. 7, looking in the direction of the arrows;

Fig. 9 is a diagrammatic view showing the arrangement of the webs prior to the final associating and longitudinal folding; and

Fig. 10 is a diagrammatic view showing the webs after the final longitudinal folding and associating.

One of the principal objects of the invention is to facilitate the association and the interfolding of one or more previously longitudinally folded webs with one or more unfolded webs, and to longitudinally fold together such webs, so that the previously folded webs are folded within the other webs, or certain of the other webs; and to insure the successful and neat folding thereof, especially in high speed machines.

In connection with the foregoing, means are provided for folding or including a plurality of previously longitudinally folded webs within an outer or incasing separately longitudinally folded web, all the webs being interfolded simultaneously with, or immediately at the consummation of, the longitudinal folding, and the inner previously longitudinally folded webs lying with their folds at a short distance from the fold of the outer and incasing web. In connection therewith means are provided for later pushing the inclosed previously folded webs snugly into the fold of the incasing web, this being preferably done by a jogging mechanism, and after the web has been cut into sheets.

So far as concerns certain features of the invention, the arrangement and the supplying of the different webs may be varied, but in the present exemplification the arrangement and supply of webs are substantially the same as in the Lang application Ser. No. 175,416, already referred to. The arrangement of the presses whereby the various webs are printed, and from which they are directed to the folding mechanism, are omitted from the present case.

An unfolded web 1, or a plurality of webs 1 and 1^a, (which latter may be produced by slitting and associating a wider web by running one of the slit parts over turning bars 10 and 11), are directed to a roller 30 at the head of a longitudinal former or folder 3. There is associated with webs 1 and 1^a at this point one or more previously longitudinally interfolded webs, and preferably three such previously longitudinally interfolded webs 4, 5 and 6, such webs being preferably laid upon the web or webs 1 and 1^a with their

fold lying substantially along the central line of the web or webs 1 and 1ª.

Such previously folded webs may be produced in any suitable manner, and as shown herein web 4 is slit by slitters 7, after being printed, one half or portion thereof being directed over a turning bar 8 and from thence over a roller 9 and from thence over a roller 15, and therefrom over a longitudinal former 16. The former 16 is disposed transversely to former 3 and is in alinement with one-half of the width of said former 3 (see Figs. 2 and 3), whereby the interfolded webs are associated with webs 1 and 1ª in the relation already described. Former 16 is provided with sets of forming rollers 17 and 18.

There is associated with the web 4 just before passing over the former 16 a web 5, or one part of the original web 5 which has been slit. Web 5 may be slit by a rotary slitter 20, one-half thereof passing over the turning bar 21 and thence about rollers 22 and 23 to the roller 15, where it is associated with the slit half of the web 4.

A web 6 is likewise associated with the webs 4 and 5, and this is also preferably a wide web which is slit by slitters 24, one-half thereof passing over a turning bar 25 and thence about rollers 26 and 27 and to the roller 15. Thus the three webs 4, 5 and 6 are associated together at the roller 15, being then passed over the former 16 and interfolded together, the so interfolded webs (indicated in Fig. 1 by x) passing about rollers 28 and 29 to the roller 30, where they are associated with and superposed upon the web 1, or webs 1 and 1ª, the interfolded webs x lying with their fold centrally and longitudinally upon the webs 1 and 1ª, as shown in Fig. 9.

In accordance with certain features of the invention, other interfolded webs are associated with those previously described, preferably lying along webs 1 and 1ª with the fold adjoining the fold of those already described. In the embodied form of means for effecting the foregoing, and referring again to the web 4, the other half 4ª thereof passes from the slitter 7 to a turning bar 34 and from thence about rollers 35, 36 and 38 to a longitudinal former 39. Former 39 is provided with sets 43 and 44 of forming rollers in the usual manner. The former 39, like the former 16 is arranged transversely to the former 3, and in alinement with the other half of the former 3 from the former 16, the former 39 facing the former 16 but preferably spaced longitudinally therefrom (see Figs. 1, 2 and 3).

Referring again to the web 5, the half 5ª thereof passes from the slitters 20 about a turning bar 40, and from thence about rollers 41 and 42 to the roller 38, where the web 5ª is associated with the web 4ª.

Referring again to the web 6, the half 6ª thereof passes from the slitters 24 to a turning bar 45, and from thence about rollers 46 and 47 to the roller 38, where it is likewise associated with the webs 4ª and 5ª. These associated webs pass over the longitudinal former 39, and are thereby interfolded and are represented in Fig. 1 of the drawings by y. The interfolded webs y pass over rollers 50 and 51 to the roller 30 where they are associated with and superposed upon the web 1 or webs 1 and 1ª, being laid alongside the interfolded webs x with their fold extending longitudinally along the webs 1 and 1ª, the folds x and y being contiguous or adjoining.

In accordance with the present invention, the other webs which are associated with those already described (and which inclose them as finally folded) are folded separately therefrom, that is, by a separate former but concurrently with the longitudinal folding of the underlying webs 1 and 1ª, all of the webs being associated simultaneously or concurrently with the folding.

In the embodied form of means for effecting this, a longitudinal folder or former 55, having a head or leading-in roll 56, is provided, said former being arranged above and in alinement with the former or folder 3, but spaced apart therefrom, the noses of the folders being quite close together, and the heads of the folders or formers being sufficiently spaced apart to permit easy access thereto in handling the webs (Figs. 5 and 6).

A plurality of sets 57 and 58 of common forming rollers are provided, coöperating with both the formers 3 and 55, thereby associating the webs at the consummation of the fold. As embodied, one set of former rollers 57 coöperate with the sides of both the formers 3 and 55, and another set of forming or pinching rollers 58 thereafter engage the folded webs to complete the fold and to forward the webs to the subsequent mechanisms.

Referring now to the final longitudinal folding together of all the webs, which occurs at the folders 3 and 55, the inner webs, including those previously longitudinally folded, x and y, and those not so folded, 1 and 1ª, are run together over the inner former 3. The webs 1 and 1ª are centrally longitudinally folded, the webs x passing down one side of the former 3 and the webs y passing down the other side thereof. At the rollers 57 and 58 they are associated with and folded within the webs 60 and 60ª, which latter webs are run over the outer former 55. For such a bulky product formed from high speed webs, this construction and arrangement provide a very efficient and positive folding mechanism.

In the present embodiment, the webs

which run over former 55 are supplied from a wide web 60, which is longitudinally slit by a rotary slitter 61, one half 60^a thereof passing over turning bars 62 and 63 and thence about rollers 64 and 65 to the leading-in roller 56. The other half 60 of the web passes about a roller 66 and thence to the roller 56 where the two halves are associated. The webs 60 and 60^a then pass over the former 55, as shown diagrammatically in Fig. 9, which represents the position of the webs as they are positioned, respectively, at the leading-in rollers 30 and 56. After the webs pass, respectively, over the formers 3 and 55, they pass between the rollers 57 and 58 and are folded and associated (as shown diagrammatically in Fig. 10) with the webs 60 and 60^a on the outside and with the webs 1 and 1^a on the inside, and with the previously folded webs *x* and *y* therebetween.

Means are provided by the invention for cutting the interfolded webs, and in connection therewith, in accordance with one feature of the invention, means for imparting a transverse fold thereto. In the embodied form thereof, rotary members 70 and 71 are provided having sets of coöperating cutting blades 72 and 73, which cut the interfolded webs *z* into separate papers. The rotary members 70 and 71 likewise carry folding blades 74 and 75 which blades coöperate alternately with folding rollers 76 and 77. Running from folding roller 76 is a series of tapes 78, running also about rollers 79 and 80. Running about roller 77 is a series of tapes 81, running also about rollers 82 and 83.

Suitable delivering means are provided, and the embodied form thereof, comprises a rotary device, such as an S wheel 84, which delivers the folded papers to an endless belt delivery 85, running over rollers 86.

By reason of the webs running partly over the longitudinal folder 3 and partly over the longitudinal folder 55 the outside web 60 has received a sharper and better fold, and the inside webs have their fold set out somewhat from the fold of the outside web 60.

Means are provided by the invention for pushing the inner web snugly into the fold of the outer web, and the embodied form thereof comprises a jogging device coöperating with the folded product *w* upon the delivery belt 85. In such embodied form jogging plates 87 and 88 are hinged, respectively, at 89 and 90 to two supports 91 and 92, at either side of the belt 85. Plate 87 is pivotally connected to a lever 93, which lever is pivotally mounted at 94. Plate 88 is pivotally connected to a lever 95, which lever is pivotally mounted at 96. The levers 93 and 95 are connected by a pivoted link 97. The levers 93 and 95 are operated in a suitable manner as by a pivoted link 98. The plates vibrate inwardly, the space therebetween gradually narrowing along the belt 85. At their exit end plates 87 and 88 are separated just the width of the paper, and as the papers *w* pass therebetween, the inner portions are completely set back into the fold of the outside portion.

The invention in its broader aspects is not limited to the exact structure shown and described, but changes may be made therefrom within the scope of the appended claims, without departing from the principles of the invention, and without sacrificing its chief advantages.

What I claim as my invention and desire to secure by Letters Patent is:—

1. A folding machine including in combination two superposed and spaced apart longitudinal formers, means for directing a web to the inner former, means for directing a folded web to said inner former and laying it upon half of the first-mentioned web, means for directing another folded web to said inner former and laying it upon the other half of the first-mentioned web, and means for directing a web to the outer former, said webs being associated by running over the formers.

2. A folding machine including in combination two superposed and spaced apart longitudinal formers, means for directing a web to the inner former, means for directing a folded web to said inner former and laying it upon half of the first-mentioned web, means for directing another folded web to said inner former and laying it upon the other half of the first-mentioned web, and means for directing a web to the outer former, said webs being associated by running over the formers, transverse cutting means, and means for pushing the folded sheets together at the fold.

3. A folding machine including in combination two superposed and spaced apart longitudinal formers, means for directing a web to the inner former, means for longitudinally folding another web and for directing said folded web to said inner former and laying it upon the first mentioned web with the fold lying inwardly, means for directing a web to the outer former, said webs being associated by running over the formers and common forming rollers coöperating with both said formers.

4. A folding machine including in combination two superposed and spaced apart longitudinal formers, means for directing a web to the inner former, means for longitudinally folding another web and for directing said folded web to said inner former and laying it upon the first-mentioned web with the fold lying inwardly, means for directing a web to the outer former, said webs being associated by running over the

formers, common forming rollers coöperating with both said formers, transverse cutting means, and means for pushing the folded sheets together at the fold.

5. A folding machine including in combination two superposed and spaced apart longitudinal formers, means for directing a web to the inner former, means for directing a folded web to said inner former and laying it upon half of the first-mentioned web, means for directing another folded web to said inner former and laying it upon the other half of the first-mentioned web, means for directing a web to the outer former, said webs being associated by running over the formers, transverse cutting means, means for pushing the folded sheets together at the fold and common forming rollers coöperating with both said formers.

6. A folding machine including in combination two superposed and spaced apart longitudinal formers, means for directing a web to the inner former, means for directing a folded web to said inner former and laying it upon half of the first-mentioned web, means for directing another folded web to said inner former and laying it upon the other half of the first-mentioned web, means for directing a web to the outer former, said webs being associated by running over the formers and common forming rollers cooperating with both said formers.

7. A folding machine including in combination two superposed and spaced apart longitudinal formers, means for directing a web to the inner former, means for directing a folded web to said inner former and laying it upon half of the first-mentioned web, means for directing another folded web to said inner former and laying it upon the other half of the first-mentioned web, means for directing a web to the outer former, said webs being associated by running over the formers, common forming rollers coöperating with both said formers, transverse cutting means, and means for pushing the folded sheets together at the fold.

8. A folding machine including in combination means for longitudinally folding a web, means for longitudinally folding another web, means for associating the longitudinally folded webs side by side upon another web, means for folding the last-mentioned web about the previously folded webs, and means for transversely folding all the webs together.

9. A folding machine including in combination means for longitudinally folding a web, means for longitudinally folding another web, means for associating the longitudinally folded webs side by side upon another web, means for folding the last-mentioned web about the previously folded webs, means for transversely cutting the interfolded webs, and means for transversely folding all the webs together.

10. A folding machine including in combination means for longitudinally folding a web, means for longitudinally folding a second web, means for bringing said webs back to back and into superposition upon an unfolded web, means for bringing another unfolded web into proximity to said webs but spaced away therefrom, and means for folding said unfolded webs longitudinally along the line of the backs of the previously folded webs while said other web is still spaced apart and thereby laying the previously folded webs one on the other with one of the other webs outside.

11. A folding machine including in combination means for longitudinally folding a web, means for longitudinally folding a second web, means for bringing said webs back to back and into superposition upon an unfolded web, means for bringing another unfolded web into proximity to said webs but spaced away therefrom, and means for folding said unfolded webs longitudinally along the line of the backs of the previously folded webs while said other web is still spaced apart and thereby laying the previously folded webs one on the other with the spaced away web on the outside and inclosing the other web.

12. A folding machine including in combination means for longitudinally folding a web, means for longitudinally folding a second web, means for bringing said webs back to back and into superposition upon an unfolded web, means for bringing another unfolded web into proximity to said webs but spaced away therefrom, and means for folding said unfolded webs longitudinally along the line of the bac s of the previously folded webs while said other web is still spaced apart and thereby laying the previously folded webs one on the other with the spaced away web on the outside and inclosing the other webs, and means for pushing the outside web snug up to the fold.

13. A folding machine including in combination means for associating and longitudinally folding a plurality of webs one within another, means for associating a second group of webs and longitudinally folding them one within another, means for bringing said folded webs back to back and into superposition upon an unfolded web, means for bringing another unfolded web into proximity with said folded webs but spaced away therefrom, and means for folding said unfolded webs longitudinally along the line of the backs of the previously folded webs while said other web is still spaced apart and thereby laying the previously folded webs one on the other with one of the other webs outside.

14. A folding machine including in combination means for associating and longitudinally folding a plurality of webs one within another, means for associating a second group of webs and longitudinally folding them one within another, means for bringing said folded webs back to back and into superposition upon an unfolded web, means for bringing another unfolded web into proximity with said folded webs but spaced away therefrom, and means for folding said unfolded webs longitudinally along the line of the backs of the previously folded webs while said other web is still spaced apart and thereby laying the previously folded webs one on the other with the spaced away web on the outside and inclosing the other webs.

15. A folding machine including in combination means for associating and longitudinally folding a plurality of webs one within another, means for associating a second group of webs and longitudinally folding them one within another, means for bringing said folded webs back to back and into superposition upon an unfolded web, means for associating a plurality of webs and bringing them unfolded into proximity to but spaced away from said folded webs, and means for longitudinally folding said associated unfolded webs about the previously folded webs while spaced away therefrom.

16. A folding machine including in combination means for longitudinally folding a web, means for longitudinally folding a second web, means for bringing said webs back to back and into superposition upon an unfolded web, means for bringing another unfolded web into proximity to said webs but spaced away therefrom, and means for folding said unfolded webs longitudinally along the line of the backs of the previously folded webs while said other web is still spaced apart and thereby laying the previously folded webs one on the other with one of the other webs outside, and means for transversely cutting the interfolded webs.

17. A folding machine including in combination means for longitudinally folding a web, means for longitudinally folding a second web, means for bringing said webs back to back and into superposition upon an unfolded web, means for bringing another unfolded web into proximity to said web but spaced away therefrom, and means for folding said unfolded webs longitudinally along the line of the backs of the previously folded webs while said other web is still spaced apart and thereby laying the previously folded webs one on the other with one of the other webs outside, and means for transversely cutting the interfolded webs, and means for transversely folding the cut and folded group of sheets.

18. A folding machine including in combination means for longitudinally folding a web, means for longitudinally folding a second web, means for bringing said webs back to back and into superposition upon an unfolded web, means for bringing another unfolded web into proximity to said webs but spaced away therefrom, and means for folding said unfolded webs longitudinally along the line of the backs of the previously folded webs while said other web is still spaced apart and thereby laying the previously folded webs one on the other with one of the other webs outside, means for transversely cutting the interfolded webs, and means for pushing the outside web snug up to the fold.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RALPH C. SEYMOUR.

Witnesses:

JOHN D. MORGAN,

FRIDA JOHNSON.